1.2

Harding Lawson Associates

A Report Prepared for

Van Waters & Rogers Inc.
6100 Carillon Point
Kirkland, Washington 98033

8/13/93

SOIL BORING SAMPLING AND ANALYSIS PLAN PRELIMINARY STUDY AREA ORDER BOISE, IDAHO

1.2

HLA Project No. 20783 0031

by

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August 13, 1993

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1.0 INTRODUCTION

Harding Lawson Associates (HLA) has prepared this sampling and analysis plan (SAP) for Van Waters & Rogers Inc. (VW&R), Kirkland, Washington, to describe the soil boring and well installation activities planned in the Affected Area, Boise, Idaho (Plate 1). The Affected Area is defined as the geographic area of a western portion of Boise in which concentrations of tetrachloroethene (Perc) in groundwater exceed the U.S. Environmental Protection Agency (EPA) maximum contaminant level (MCL) of 5 micrograms per liter (μg/l). This SAP has been prepared to meet the requirements of the Preliminary Study Area (PSA) Consent Order dated October 9, 1992 (PSA Order), between VW&R and the Idaho Department of Health and Welfare, Division of Environmental Quality (Department). This SAP addresses comments received from the Department (*Department, 1993b, 1993c*) on the draft Soil Boring SAP dated May 10, 1993 (*HLA, 1993c*). Copies of the Department's comments letters and response letters from VW&R (*VW&R, 1993a, 1993b*) are included as an appendix.

The scope of work for the PSA was originally outlined in *Exhibit 1, Work Plan, Preliminary Study Area Investigation, Boise, Idaho (HLA, 1992a)*. The original scope consisted of drilling soil borings to (1) evaluate the extent and possible source of Perc Compounds (Perc and its degradation compounds), (2) characterize the geology and hydrogeology within the PSA, (3) provide data to assist in the selection and design of remedial measures, and (4) to assess apparently anomalous soil gas data. On the basis of results of groundwater sampling within the PSA *(HLA, 1992c)*, no soil gas survey was performed in the PSA. In a letter dated December 10, 1992 (*Department, 1992*), the Department concurred with VW&R's contention that a soil gas survey would provide little additional information regarding the spatial extent of the Perc plume within the

PSA. Therefore, the purpose of this proposed investigation is to gather data to assist in the characterization of geologic and hydrogeologic conditions at the leading edge of the Affected Area and to provide information about the vertical distribution of Perc. The scope of work includes drilling a pilot boring and collecting groundwater samples to evaluate the vertical distribution of Perc at the northwest (downgradient) end (along Five Mile Road) of the Affected Area, completing the boring as a well, using the data from the pilot boring to complete one additional nearby well, collecting groundwater samples from the wells, and analyzing the data. The wells installed along Five Mile Road, hereafter referred to as monitoring/extraction wells, will be constructed to allow for potential future use as extraction wells.

Additionaly, the scope includes drilling a boring between The Affected Area and the Bali Hai community well, collecting groundwater samples from the boring to evaluate the vertical distribution of Perc, completing the boring as a well, collecting groundwater samples from the well, and analyzing the data. This well will be used for monitoring purposes only. Additional wells may be proposed in the future, as appropriate, based on ongoing quarterly monitoring analytical results, and supplemental data to be obtained from two additional private wells located near the northwest end of the Affected Area (*VW&R, 1993*).

The background and scope of work for this investigation are presented in Sections 2.0 and 3.0, respectively. A schedule for the proposed investigation is presented in Section 4.0, and references cited in this SAP are listed in Section 5.0. The field and laboratory procedures to be used for work activities outlined in this SAP are described in the Quality Assurance Project Plan (QAPP) *(HLA, 1992b)*.

2.0 BACKGROUND

VW&R has conducted two rounds of groundwater sampling in the Preliminary Affected Area (PAA). The initial sampling round was conducted in August 1992. Results of the initial sampling were presented in HLA's *Initial Groundwater Sampling Report, Preliminary Affected Area, Water Supply Order, Boise Idaho* (*HLA, 1992c*). This report also contained the Resampling Plan and Supplemental Sampling Plan required by the January 3, 1992, Water Supply Order between VW&R and the Department. Results of the initial sampling indicated the presence of Perc in 11 of the 28 well samples at concentrations ranging from 1.6 to 750 µg/l. As described in the Resampling Plan, samples from 6 of the 28 wells contained Perc above the analytical detection limit but below the MCL of 5 µg/l. These 6 wells are to be sampled quarterly to verify and monitor perc concentrations. As described in the Supplemental Sampling Plan, an additional 5 wells along Maple Grove Road were identified for sampling to further define the Affected Area.

Supplemental sampling and resampling were conducted concurrently with sampling of Special Resource Management (SRM) and Chen-Northern monitoring wells in the PSA in February 1993 to obtain comparable data for all wells. Data from the August 1992 and February 1993 sampling events were collectively evaluated to aid in the identification of the Affected Area. A total of 49 data points were plotted on a map and the Affected Area boundary of 5 µg/l was defined (Plate 1). The results were presented in a letter to the Department dated March 24, 1993 (*HLA, 1993a*). In a letter dated April 6, 1993 (*Department, 1993a*), the Department concurred with VW&R's interpretation of the Affected Area boundary.

VW&R recently completed a pilot boring program and geophysical seismic reflection pilot study at the Boise Towne Square Mall. The results of the geophysical

pilot study were presented in the *Geophysical Sampling and Analysis Plan* (*HLA, 1993b*). The seismic reflection pilot study was conducted during the week of April 12, 1993, at three locations (two at the Mall and one at 1941 Five Mile Road).

Data from test lines at the Mall indicate strong reflecting horizons are present at depths generally greater than 160 feet. A strong reflector may indicate the presence of a clay layer whereas a weak reflector may represent a more subtle change in lithology such as from a coarse sand to a fine sand. Data from the test line at 1941 Five Mile indicate a weak reflector at an approximate depth of 100 feet and stronger reflections beginning at an approximate depth of 150 feet.

The presence of a shallow, continuous clay or low permeability layer beneath the Mall was not indicated by data collected during the geophysical or pilot boring investigations. Chemical data obtained from groundwater samples collected during the drilling of the pilot borings for Wells MW-1 and MW-2 (located near the Olive Garden restaurant and Pier 1 Imports store, respectively), groundwater samples collected from the completed monitoring wells, and analytical data from previous groundwater sampling activities at the Mall suggest that the Perc is limited to the shallow portion of the aquifer. These data suggest that despite the absence of a shallow, continuous clay or low permeability layer beneath the Mall, migration of Perc to the deeper portion of the aquifer does not appear to have occurred. Migration of Perc to the deeper portions of the aquifer would likely require a downward hydraulic gradient, such as that generated during pumping of a deep well. Although a shallow, low permeability confining layer was not encountered beneath the Mall, chemical data collected during the pilot boring program indicate that vertical (downward) groundwater flow within the aquifer is not extensive.

3.0 SCOPE OF WORK

3.1 Boring and Well Installation

To monitor chemical concentrations at the northwest end of the Affected Area and between the Affected Area and the Bali Hai community well, three borings will be drilled and wells installed at the locations shown on Plate 2. Initially the wells installed at the northwest end of the Affected Area will be used for monitoring purposes, however, they will be constructed so that they may be converted to extraction wells in the future, if appropriate. The well installed between the Affected Area and Bali Hai community well is intended for monitoring purposes only. Drilling and well installation will be conducted under the supervision of a VW&R representative and an HLA geologist. The vertical distribution of Perc will be assessed by collecting groundwater samples from the pilot boring at the northwest end of the Affected Area along Five Mile Road and from the boring between the Affected Area and Bali Hai well. Data from the pilot boring will be used to determine target depths of the other monitoring/extraction well boring. Field activities will be conducted under the existing Job Safety Plan. If field conditions encountered during drilling prohibit use of the methods described below, the Department will be contacted and alternatives discussed.

The borings for the monitoring/extraction wells will be drilled using air casing hammer methods. The monitoring well between the Affected Area and the Bali Hai well will be drilled using a hollow-stem auger drill rig. They will be lithologically logged by an HLA geologist and detailed field logs prepared. Soil cutting samples will be collected at 5-foot intervals and/or at each observed change in lithology and will be classified using ASTM D 2488-90, which is based on the Unified Soil Classification System. An Idaho-registered professional geologist will review the field logs.

Target zones for groundwater samples collected from the pilot boring and the boring between the Affected Area and Bali Hai well are anticipated to be at approximately 20-foot and 10-foot intervals, respectively, throughout the borings. Groundwater samples will also be collected at significant changes in lithology, where possible. In situ groundwater samples will be collected during drilling using a Hydropunch II sampler. Drilling will proceed to slightly above the target zone, the sampler will be driven into the zone, and the sample inlet will be opened, allowing groundwater to flow into the sample chamber. If lithologic conditions (e.g., the presence of gravel) prevent collection of groundwater samples with the Hydropunch tool, samples will be collected by lowering a stainless steel bailer down the drill pipe to the bottom of the boring. The sampler or bailer will then be brought to the surface and the sample poured from the sample chamber into a laboratory-provided volatile organic analysis (VOA) vial.

Groundwater samples will be analyzed on an expedited 24-hour turnaround basis. When groundwater samples with Perc concentrations below 5 μg/l are obtained, drilling will cease. The boring will be backfilled to the depth at which the first groundwater sample with Perc concentrations below 5 μg/l was obtained. If no groundwater samples contain Perc below 5 μg/l, the boring will be drilled to the first encountered lower permeability unit or to a maximum depth of approximately 150 feet.

The boreholes will be completed as wells under the supervision of HLA and/or VW&R. The monitoring/extraction wells will be constructed using a minimum 6-inch-diameter wire-wrapped stainless steel casing and screen. The monitoring well will be constructed of 4-inch-diameter Schedule 40 PVC casing and screen. A filter pack will be placed adjacent to and slightly above the screened interval; screen length,

screen slot size and appropriate filter pack will be determined on the basis of results of the lithologic and chemical information obtained from the pilot boring.

After well completion, the wells will be allowed to set for at least 24 hours and then developed. The wells will be developed by a combination of swabbing, surging, bailing, and/or pumping. Groundwater samples will then be collected from the wells approximately 72 hours after well development in accordance with procedures described in the QAPP (*HLA, 1992b*).

All drilling fluids, cuttings, and well development fluids will be contained and stored at the VW&R field office pending the results of chemical analyses. Disposal methods will depend on the analytical results, as discussed in the QAPP (*HLA, 1992b*).

3.2 Laboratory Analytical Program

The Hydropunch groundwater samples will be transported under chain of custody to Alchem Laboratory, Boise, Idaho, for expedited 24-hour analysis for halogenated volatile organic compounds (VOCs) using EPA Test Method 8010. The groundwater samples collected from the completed wells will be transported under chain of custody to Analytical Technologies, Inc. (ATI), Renton, Washington and analyzed for VOCs using EPA Test Method 8010.

4.0 SCHEDULE

Field work is scheduled to begin within 14 calendar days of Department approval of the SAP. Actual drilling dates may vary due to the availability of drilling subcontractors, access negotiations, and/or permitting issues. Following completion of all field work and receipt of final analytical data, the results will be submitted to the Department.

5.0 REFERENCES

Harding Lawson Associates (HLA), 1992a. *Exhibit 1, Work Plan, Preliminary Study Area Investigation, Boise, Idaho.* September 8.

_____, 1992b. *Quality Assurance Project Plan. Former VW&R Facility, Boise, Idaho.* November 2.

_____, 1992c. *Initial Groundwater Sampling Report, Preliminary Affected Area, Water Supply Order, Boise, Idaho.* November 17.

_____, 1993a. Letter to Ron Lane, Idaho Department of Health and Welfare, Division of Environmental Quality. March 24.

_____, 1993b. *Geophysical Sampling and Analysis Plan, Boise Mall Order, Boise, Idaho.* Letter to Ron Lane, Idaho Department of Health and Welfare, Division of Environmental Quality. May 6.

Idaho Department of Health and Welfare, Division of Environmental Quality (Department), 1992. Letter to Gail Clement, Van Waters & Rogers, Inc. December 10.

_____, 1993a. Letter to Mike Gaudette, Van Waters & Rogers, Inc. April 6.

_____, 1993b. Letter to Mike Gaudette, Van Waters & Rogers Inc. June 2.

_____, 1993c. Letter to Mike Gaudette, Van Waters & Rogers Inc. July 8.

Van Waters & Rogers Inc., 1993a. Letter to Rob Howarth, Idaho Department of Health and Welfare, Division of Environmental Quality. June 14.

_____, 1993b. Letter to Ron Lane, Idaho Department of Health and Welfare, Division of Environmental Quality. August 5.

PLATES

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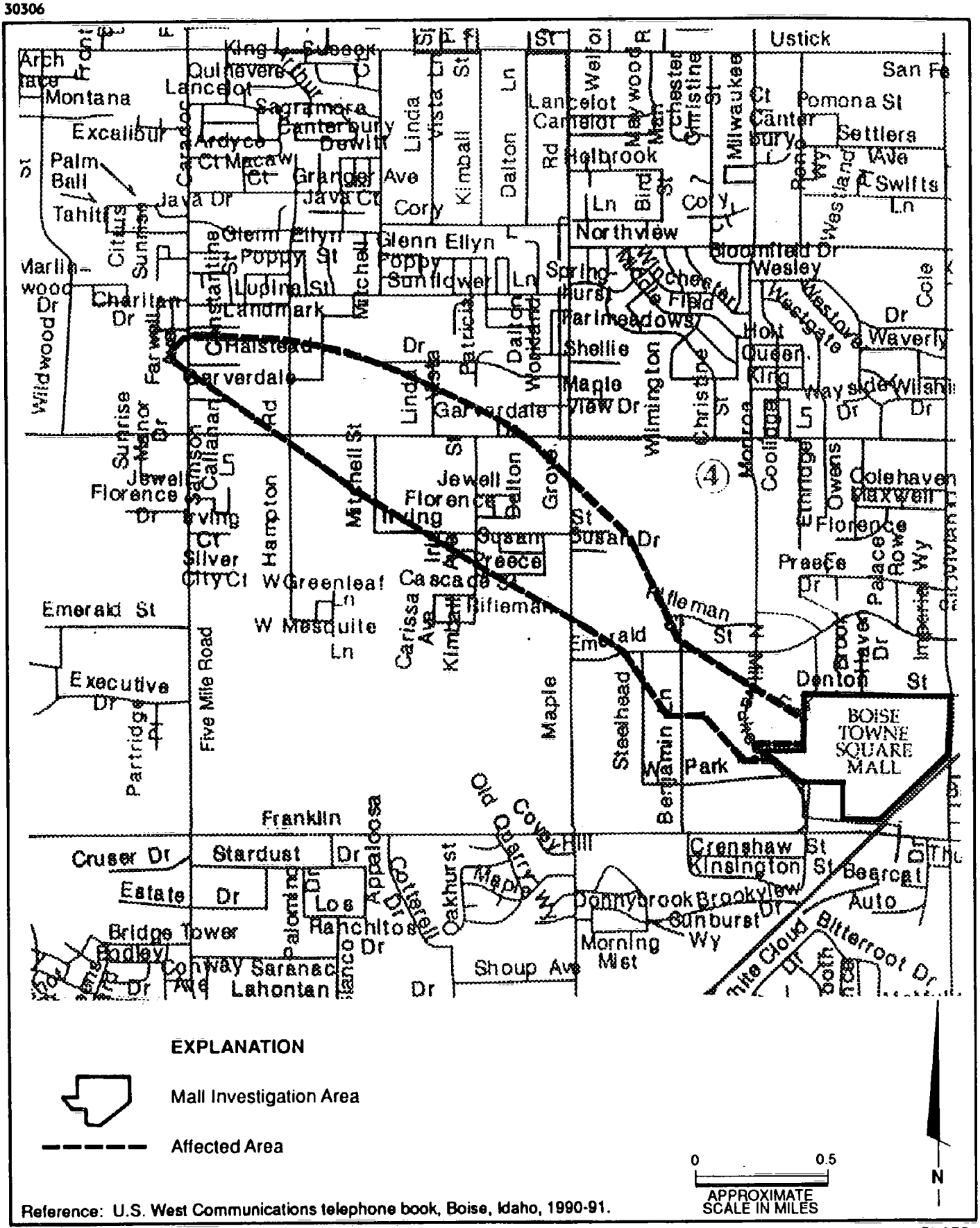


EXPLANATION

Mall Investigation Area

Affected Area

0 0.5

APPROXIMATE SCALE IN MILES

N

Reference: U.S. West Communications telephone book, Boise, Idaho, 1990-91.

PLATE

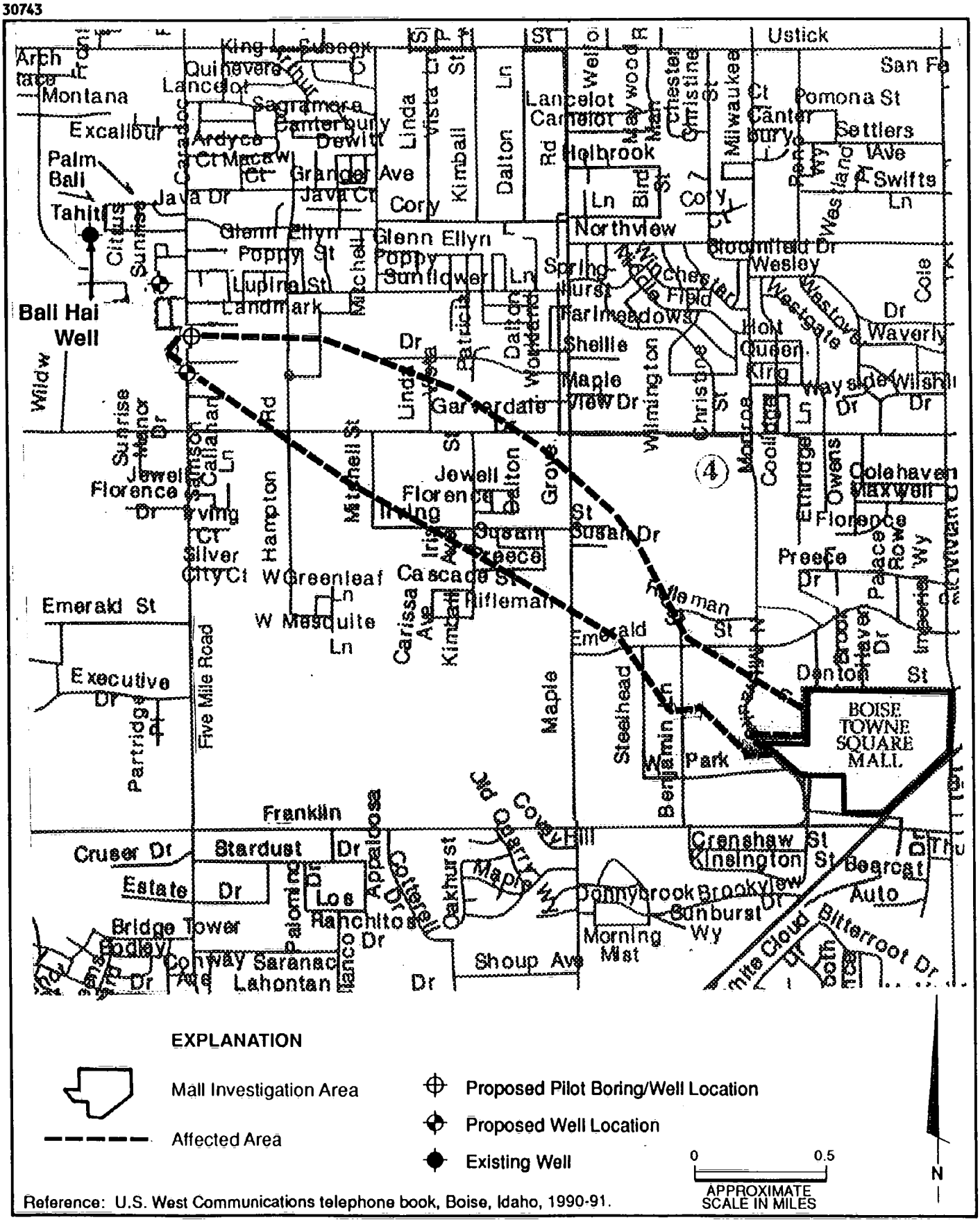
1

Harding Lawson Associates
Engineering and Environmental Services

Affected Area
Soil Boring Sampling and Analysis Plan
Boise, Idaho

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
LZ	22947 0031	SMB	3/93	

30743



Harding Lawson Associates
Engineering and Environmental Services

Proposed Boring/Well Locations
Soil Boring Sampling and Analysis Plan
Boise, Idaho

PLATE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
LZ	22947 0031		3/93	

APPENDIX

DEPARTMENT COMMENTS AND VW&R RESPONSE TO COMMENTS LETTERS

IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

1420 North Hilton, Boise, ID 83706-1260, (208) 334-0550

Cecil D. Andrus, Governor

June 2, 1993

Mike Gaudette
Van Waters & Rogers, Inc.
2723 South Cole Road
Boise, Idaho 83709

Dear Mr. Gaudette:

The Division of Environmental Quality has received the draft report titled *Soil Boring Sampling and Analysis Plan, Preliminary Study Area Order, Boise, Idaho* (dated May 10, 1993) submitted on your behalf by Harding Lawson Associates. Although we find most of the plan acceptable, we are requesting clarification or modification of the following items prior to final approval:

- Please explain how the absence of a shallow, low permeability confining layer, indicates the lack or insignificance of downward ground water flow (see page 5).

- We request that you amend your drilling plan to allow the northwestern-most monitoring well to be completed at the depth of the first screened interval of the Bali Hai community well. We will not require that the monitoring well be completed at this depth if a significant confining unit is encountered at a shallower depth. We believe that this change in the drilling plan will provide greater security through early detection of contaminants approaching the Bali Hai well.

These comments were also discussed at the last quarterly progress meeting held in Boise. Please consider the comments and feel free to contact me if you have any questions.

Sincerely,

Rob Howarth

Rob Howarth
Environmental Hydrogeologist

Enclosures

cc: Chris Smith, HLA
Ron Lane, DEQ/SWIRO
Doug Conde, Deputy Attorney General
PSA File

Van Waters & Rogers Inc.
subsidiary of Univar

2723 S. Cole Road
Boise, ID 83709
PHONE: (208) 362-6545
FAX: (208) 362-6548

June 14, 1993

Mr. Rob Howarth
Idaho Department of Health and Welfare
Division of Environmental Quality
1420 North Hilton
Boise, Idaho 83706-1260

Dear Mr. Howarth:

Van Waters & Rogers Inc. has reviewed the comments received from the Division of Environmental Quality (DEQ) pertaining to the Soil Boring Sampling and Analysis Plan for the Preliminary Study Area. This plan contained details for the installation of monitoring wells at the distal end of the Affected Area and between the Affected Area and the Bali Hai community well. Comments received from the DEQ are reproduced in this letter followed by VW&R's response.

COMMENT 1:

Please explain how the absence of a shallow, low permeability confining layer indicates the lack or insignificance of downward ground water flow (page 5).

RESPONSE TO COMMENT 1:

The statement being referenced on pages 4 and 5 does not clearly convey the point being made. The sentence should be rewritten as follows: Although a shallow, low permeability confining layer was not encountered beneath the Mall, chemical data collected during the pilot boring program indicate that vertical (downward) ground water flow within the aquifer is not significant.

COMMENT 2:

We request that you amend your drilling plan to allow the northwestern-most monitoring well to be completed at the depth of the first screened interval of the Bali Hai community well. We will not require that the monitoring well be completed at this depth if a significant confining unit is encountered at a shallower depth. We believe that this change in the drilling plan will provide a greater security through early detection of contaminants approaching the Bali Hai well.

RESPONSE TO COMMENT 2:

VW&R shares the DEQ's concern for protection of water quality downgradient of the Affected Area, particularly in the vicinity of the Bali Hai community well. Installation of a monitoring well between the Affected Area and the Bali Hai well is an important component of any protection strategy; however, based on available data, we believe that a deep monitoring well is not warranted.

We have reviewed the well log for the Bali Hai well and have determined that the uppermost screened interval is from 347 feet to 356 feet below ground surface. Geophysical data for the well also indicates sandy gravel comprises the upper 40 feet of the borehole, followed by approximately 95 feet of silty sand. Beneath the silty sand, at a depth of approximately 135 feet and extending to a depth of 210 feet, is a "blue" clay. Alternating layers of sand, silty sand, and clay are found at depths greater than 210 feet. The thicknesses of the sand and silty sand layers range from approximately 20 feet to 50 feet; the thicknesses of the clay layers range from approximately 20 feet to 120 feet. The Bali Hai well is screened in the sand and silty sand layers.

Surface geophysical data collected from the horse pasture at 1941 Five Mile Road during the pilot boring program indicated the presence of significant reflectors typical of a clay layer at an approximate depth of 150 feet. This significant reflector likely corresponds to the blue clay noted on the Bali Hai well log. This layer, as well as deeper clay layers encountered during the drilling of the Bali Hai well, would be expected to inhibit downward flow of ground water under non-pumping conditions, and potentially under pumping conditions.

VW&R proposes that the influence, if any, pumping of the Bali Hai well has on the shallow aquifer be evaluated and appropriate action be implemented based on the results of the evaluation. To evaluate what effect pumping of the Bali Hai well has on the shallow aquifer, a monitoring well will be installed as described in the Soil Sampling and Analysis Plan. A data logger and transducer will be utilized to provide a record of water levels within the well. Water levels will be monitored during one pumping period (i.e., summer) and the three month period following cessation of pumping. In addition, two existing domestic wells will be added to the list of wells that are sampled each quarter. These include a 100-foot deep well located at the LDS church on Five Mile Road and a 269-foot well located at the distal end of the Affected Area. Data collected during the August 1992 sampling event indicated perc was not detected in either of the ground water samples collected from these wells.

If the results of the water-level monitoring and/or chemical sampling indicate movement of perc-containing ground water toward the Bali Hai well, additional well monitoring or protection alternatives will be evaluated.

We trust the clarification and modification presented above are acceptable to the DEQ. If you have any questions, or would like to discuss either if these issues further, please contact me at 362-6545. A voice mail message can also be left for me at 1-800/284-6264, extension 8455.

Sincerely,

Michael V. Gaudette

Michael V. Gaudette
Senior Project Manager

Boise/SSAPCOM.RES

cc: Michelle Beekman, HLA
Wayne Grotheer, Univar
Ron Lane, DEQ
Doug Conde, Deputy Attorney General

IDAHO DEPARTMENT OF HEALTH AND WELFARE
DIVISION OF ENVIRONMENTAL QUALITY

1410 North Hilton, Boise, ID 83706-1255, (208) 334-0550

Cecil D. Andrus, Governor

July 8, 1993

Mr. Mike Gaudette
Van Waters & Rogers, Inc.
2723 South Cole Road
Boise, Idaho 83709

Dear Mr. Gaudette:

The Division of Environmental Quality has reviewed your response to our comments regarding the draft Soil Boring Sampling and Analysis Plan (SAP) for the Preliminary Study Area. Your response to our first comment on vertical ground water flow is adequate. Also, your compromise on the monitoring of perc in the area near the Bali Hai well appears reasonable.

Please incorporate your proposed changes in the draft SAP and submit to our office for final approval.

Feel free to contact me at (208) 334-0550 if you have any questions concerning this matter.

Sincerely,

Rob Howarth

Rob Howarth
Environmental Hydrogeologist

cc: Chris Smith, HLA
Ron Lane, DEQ/SWIRO
Doug Conde, Deputy Attorney General
PSA File

Van Waters & Rogers Inc.
subsidiary of Univar

2723 S. Cole Road
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August 5, 1993

Mr. Ron Lane
Idaho Division of Environmental Quality
1420 N. Hilton
Boise, ID 83706-1290

Dear Ron:

Thank you for taking the time earlier this week to discuss issues related to finalizing the Asymptotic Protocol and construction of the "guard well" between the distal end of the Affected Area and the Bali Hai community well. As we discussed, I have instructed Harding Lawson Associates to prepare a formal response to the State's July 15, 1993 letter conveying results of the State's review of the proposed statistical approach for the determination of an asymptotic limit for the remediation project in West Boise. After the State has reviewed our response, I suggest a conference call between VW&R and the State be initiated to discuss any differences that may remain. I believe this represents the most efficient and effective way of resolving any remaining issues.

The other topic we discussed this morning addressed construction details and subsequent monitoring of the guard well. It is our intention to include the guard well in the quarterly sampling schedule currently being implemented in the PSA. Ground-water samples will be collected from the well on a quarterly basis and analyzed for volatile organic compounds (VOCs) utilizing EPA Method 8010. These results will be reported to the State in a letter.

The construction details for the guard well described in the Soil Sampling and Analysis Plan for the Preliminary Study Area will be revised such that a four-inch diameter monitoring well will be constructed. The final depth of the well and the screened interval will be determined in the field based on results of chemical profiling. Grab water samples will be collected at ten foot intervals during the drilling of the borehole and analyzed for VOCs utilizing EPA Method 8010. These samples will be submitted to Alchem Laboratories in Boise for expedited analysis.

If you have any questions, please call me in Boise or leave a voice mail message at 1-800-284-6264, extension 8455.

Sincerely,

Michael V. Gaudette
Senior Project Manager

MVG/jle

Boise/S_SAPPSA.893

cc: Wayne Grotheer, VU&R
michelle Beekman, HLA

DISTRIBUTION

SOIL BORING
SAMPLING AND ANALYSIS PLAN
PRELIMINARY STUDY AREA ORDER
BOISE, IDAHO
August 13, 1993

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1 copy:	Van Waters & Rogers Inc. 2723 South Cole Road Boise, Idaho 83709 Attention: Mr. Mike Gaudette	2
4 copies:	Preston Thorgrimson Shidler Gates & Ellis Attorneys at Law 5400 Columbia Center 701 Fifth Avenue Seattle, Washington 98104-7078 Attention: Mr. Scott Vokey	3-6
3 copies:	Idaho Department of Health and Welfare Division of Environmental Quality 1410 North Hilton Boise, Idaho 83706-1253 Attention: Ron Lane	7-9
5 copies:	Harding Lawson Associates	10-14

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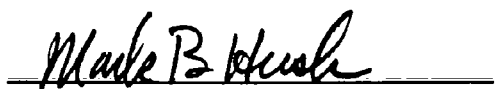

Mark B. Hersh
Associate Hydrogeologist